

(12) **UK Patent Application** (19) **GB** (11) **2 398 717** (13) **A**

(43) Date of A Publication 01.09.2004

(21) Application No: 0304585.3

(22) Date of Filing: 28.02.2003

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(51) INT CL⁷:
A01K 85/00

(52) UK CL (Edition W):
A1A A17E

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(58) Field of Search:
UK CL (Edition V) A1A
INT CL⁷ A01K
Other:

(54) Abstract Title: **Fishing Lure**

(57) A fishing lure comprising a head 1 and at least one tentacle 4a attached and extending from the head, the head comprising at least one turbulence generating feature (44, fig.4) which disrupts water flow over the tentacle as the lure is pulled through a body of water. The tentacle is preferably a flexible cylinder, strip or tape. The turbulence generating feature is one of a rib, ring, lip, edge, spike, protrusion, perforation, cavity, appendage, bead or discontinuity in girth. The turbulence generating features may be equally spaced along the length of the tentacle. The lure preferably has a plurality of tentacles, arranged as a skirt 2a. There may also be a second skirt 2b of a plurality of tentacles, the second skirt arranged under the first skirt. Also claimed are a tentacle, a skirt and a head for a fishing lure and a fishing lure comprising a head and a removable skirt.

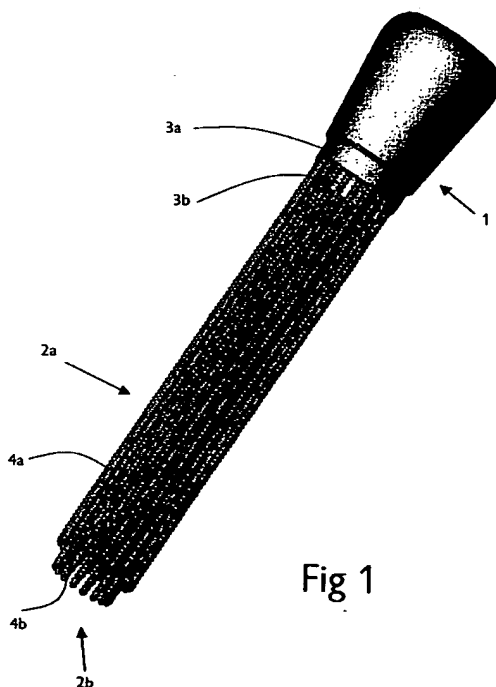
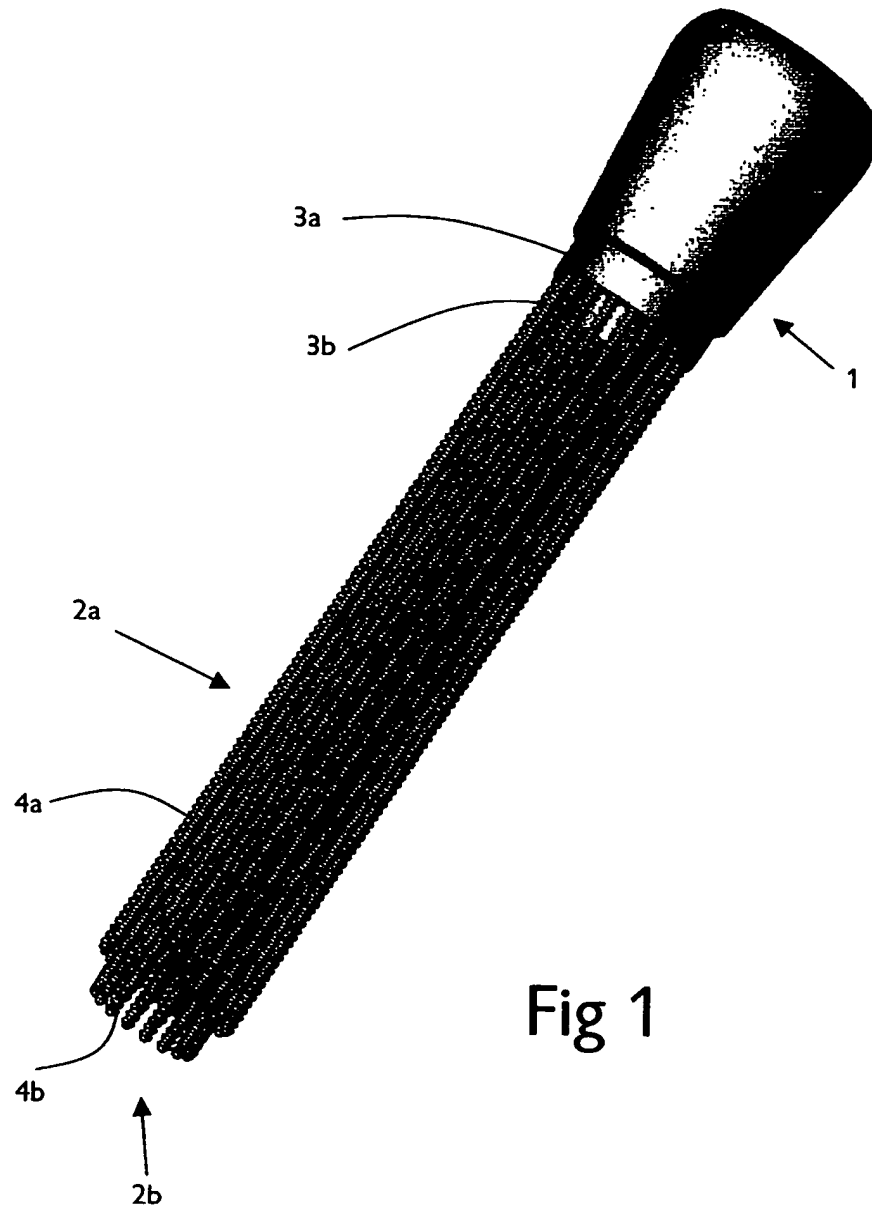


Fig 1



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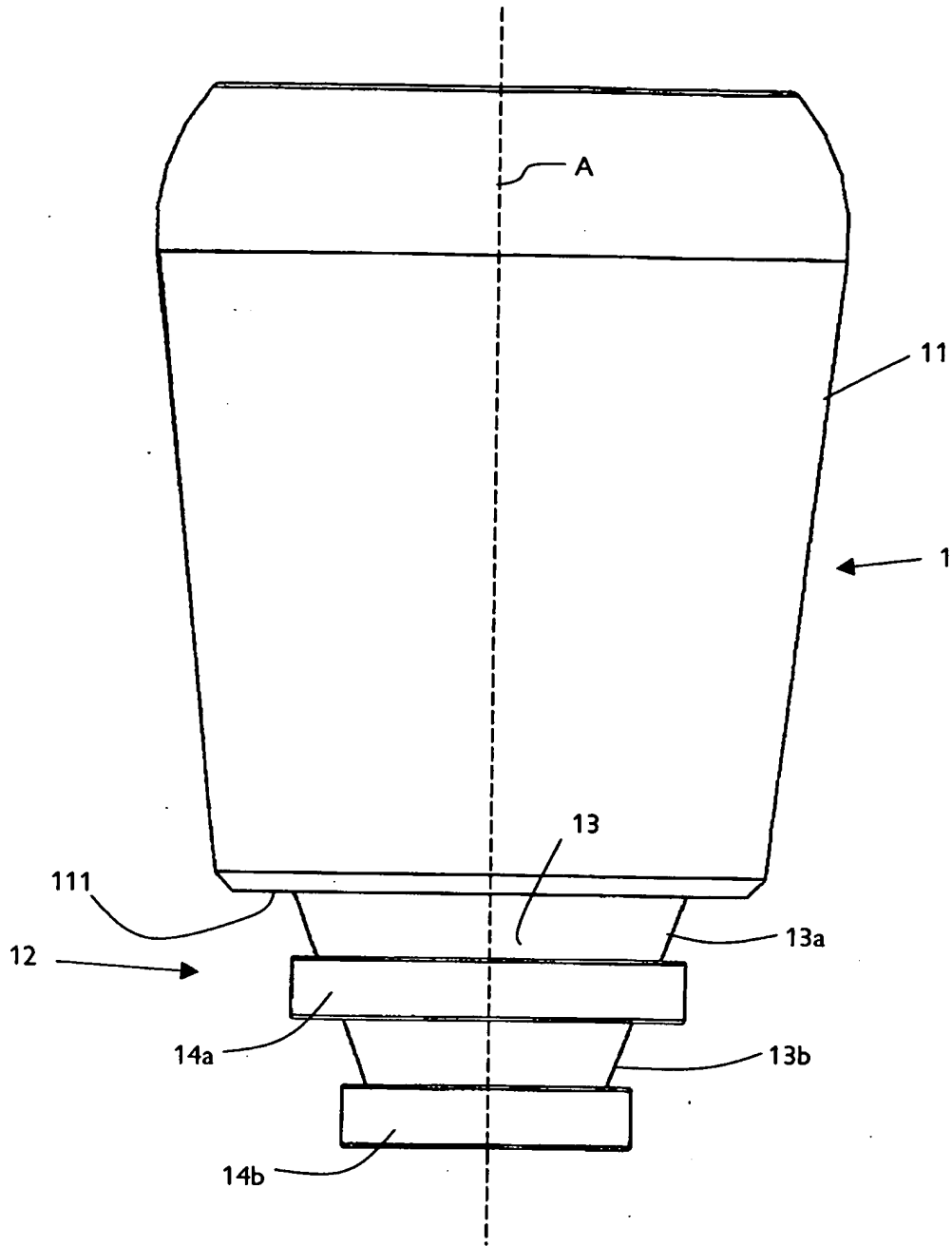


Fig 2

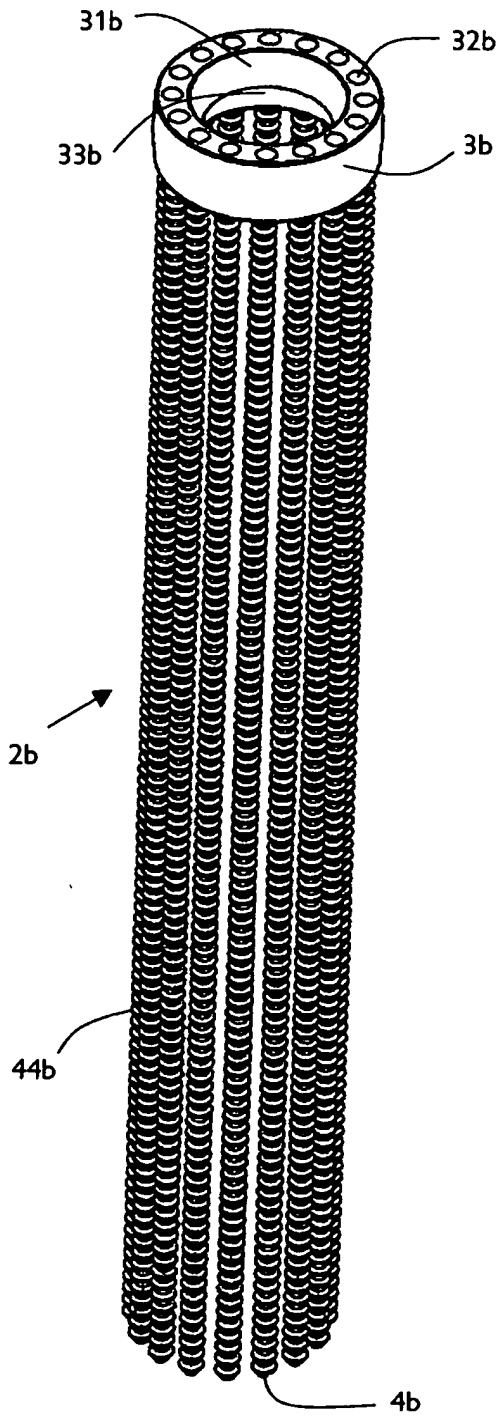


Fig 3

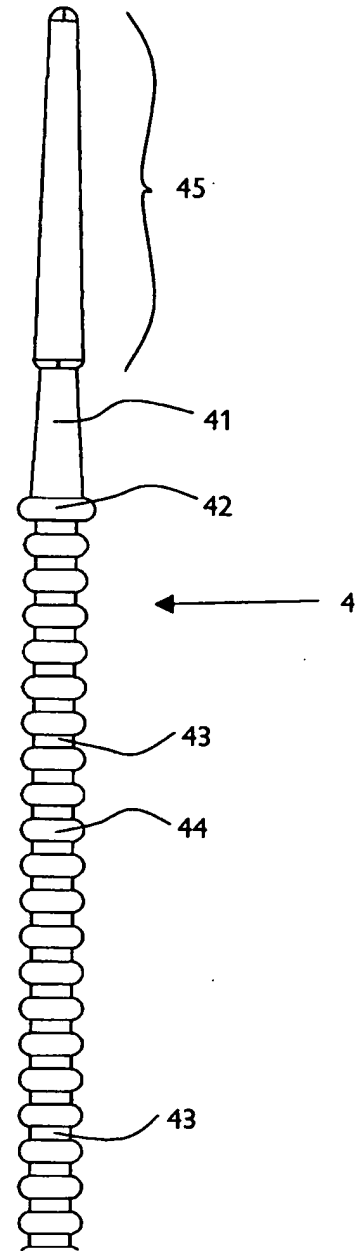
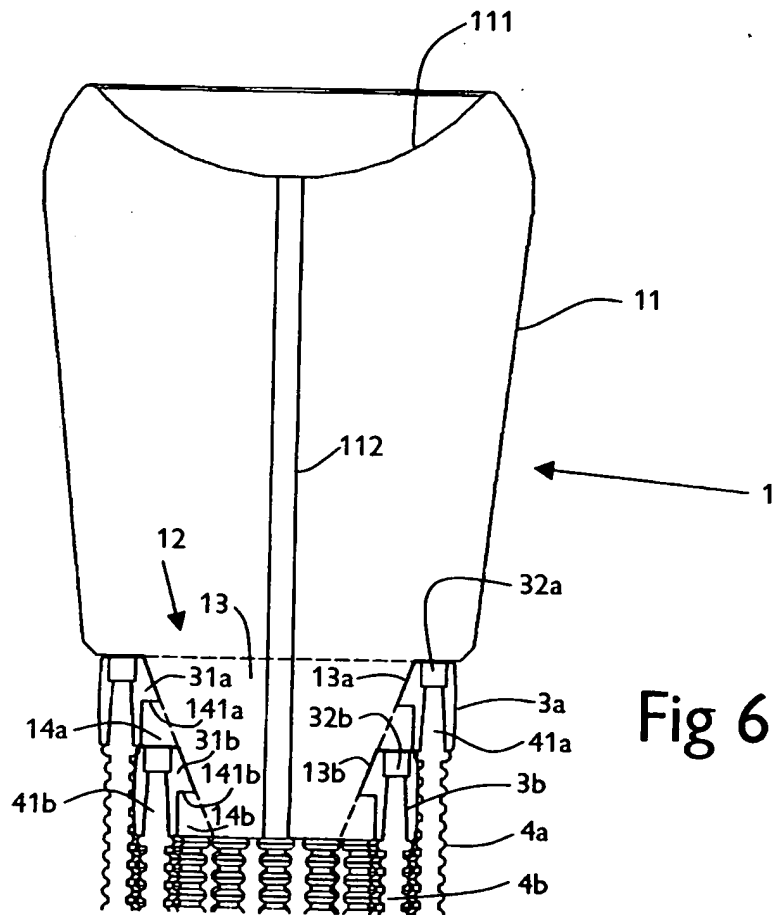
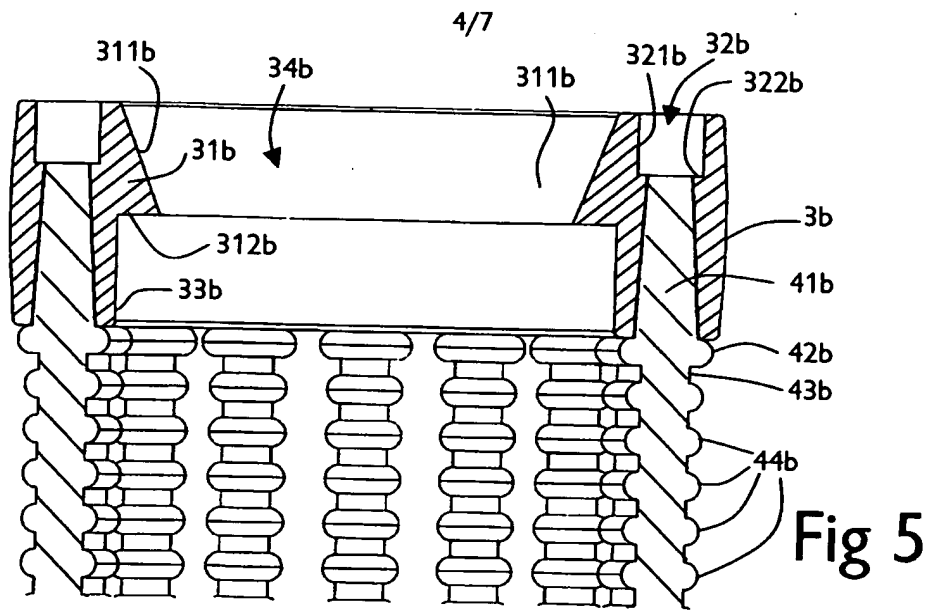


Fig 4



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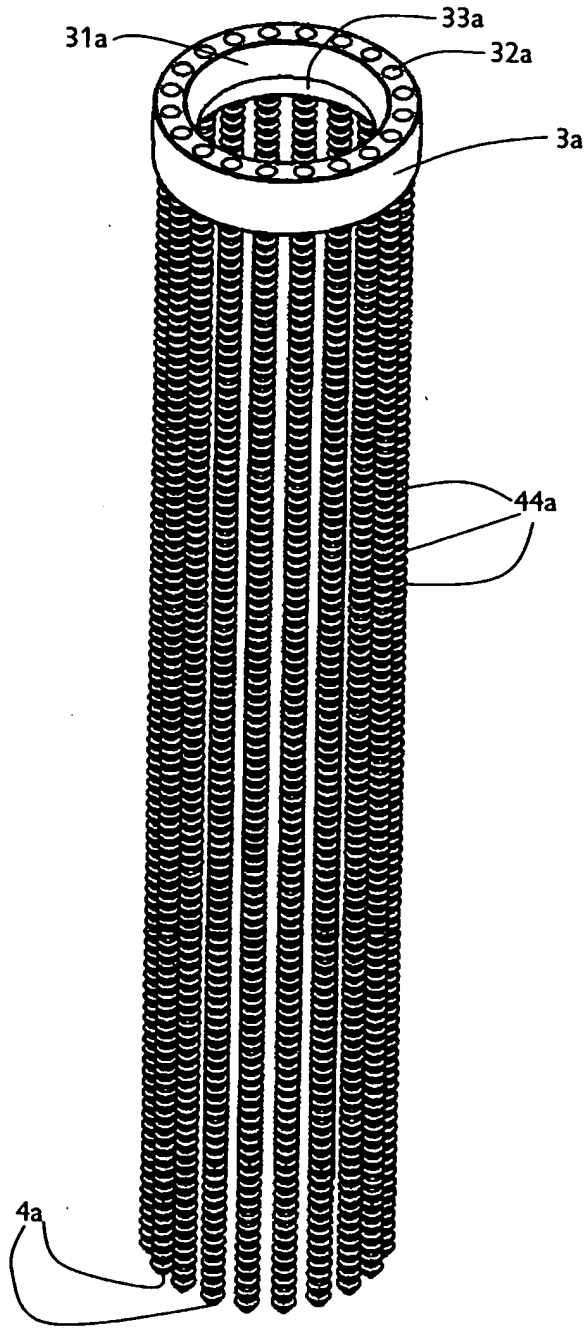


Fig 7

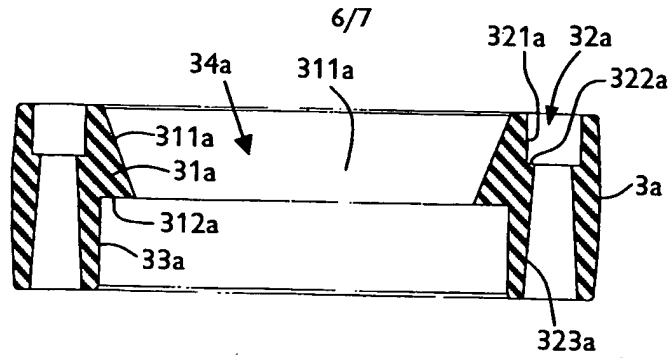


Fig 8

Fig 9

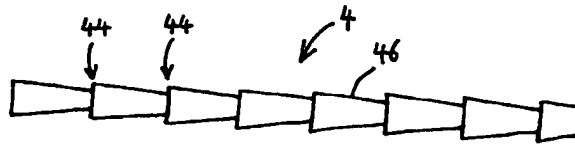


Fig 10

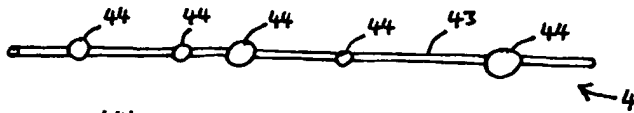


Fig 11

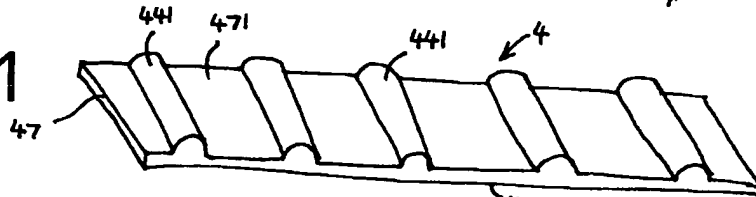


Fig 12

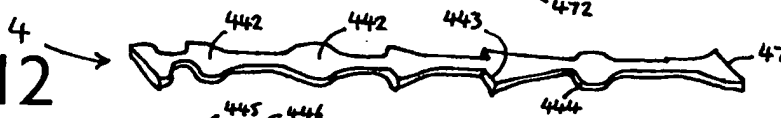


Fig 13

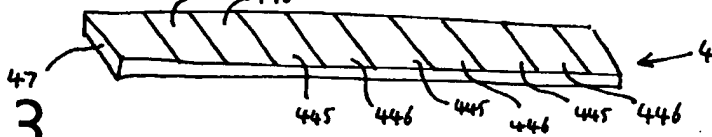


Fig 14

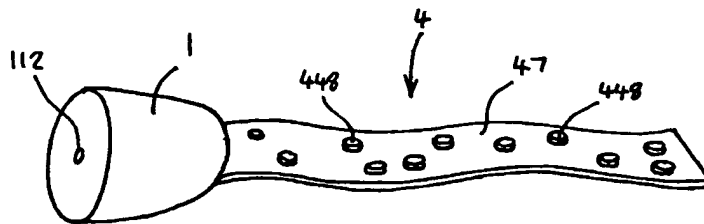


Fig 15

Fig 16

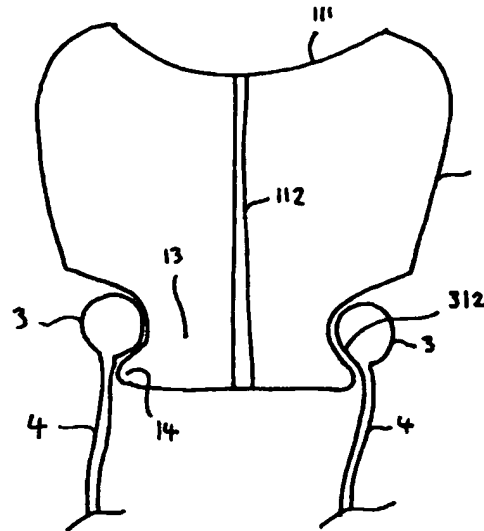


Fig 17

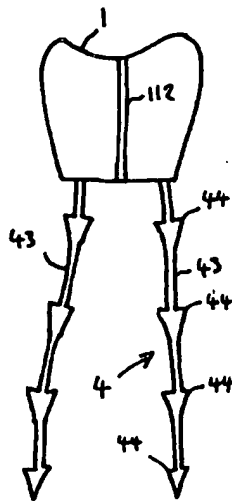


Fig 18

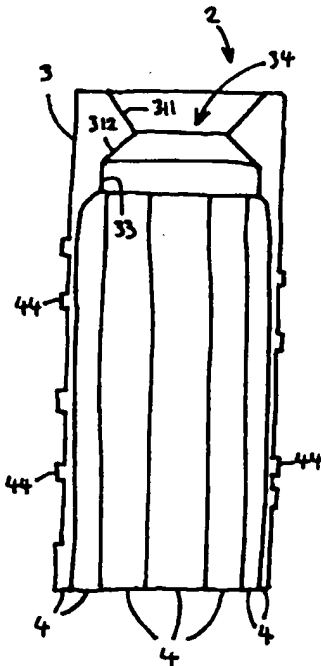
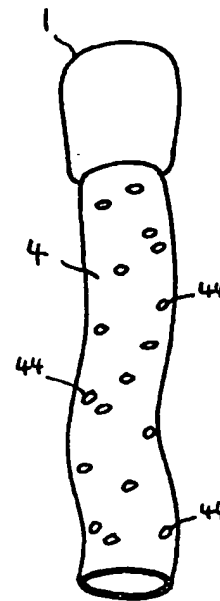


Fig 19



FISHING LURE**Field of the Invention**

The present invention relates to fishing lures, and in particular, although not exclusively, to trolling lures used in big game sport fishing.

5 Background to the Invention

Trolling lures are used in big game sport fishing and are essentially a form of artificial bait (lure) that is designed to simulate a fish, squid or other aquatic creature and to attract predatory fish species typically pursued in sport fishing for example Marlin, Sailfish, Swordfish, Tuna, Dorado, Wahoo, Barracuda, Kingfish and Spanish Mackerel.

10 The term "trolling lure" is derived from the fact that the lure is typically deployed from a moving boat and is pulled along (trolled) behind the boat. Although these trolling lures are artificial baits, and are usually employed purely in their own right, it is not uncommon to use these lures in conjunction with a real natural bait, e.g. fish, squid, crustacean etc. The natural bait would be attached to the hook and the trolling lure then placed
15 on the fishing line immediately in front of the bait in order to add further attraction by means of colour, movement or turbulence in the water.

 The normal method for attaching these trolling lures to the fishing line is by threading the fishing line through the hole, which runs lengthwise through the head of the lure, then attaching the fishing hook (or hooks) to the end of the line. The lure is then
20 allowed to slide down the line so that the base of the head rests against the eye of the hook and the hook is concealed within the skirt of the lure. It is regarded as important that the lure can move and slide up the line and away from the hook. This is due to the fact that aggressive predators, such as Marlin, will thrash wildly and throw their heads from side to side when hooked. If the lure were fixed in position the weight of the lure
25 would provide leverage for the fish to throw the hook free. By allowing the lure to slide freely on the line it will move away from the fish when it shakes its head and is less likely to pull the hooks free. It is common for the length of fishing line that is tied immediately to the hook, and on which the lure slides, to be considerably thicker than the main line contained on the fishing reel, it may even be steel wire. This is to provide resistance to
30 abrasion or the fish's teeth. This initial length of line (or wire) is called a "leader" or

“trace” and is often up to 8 metres in length. The leader may be tied directly onto the main line contained on the fishing reel by means of a suitable knot, but more often the two lines are joined by means of a rotating swivel fitted with a quick change connector. This allows the lure, hook and leader to be changed quickly if required and the swivel prevents the movement of the lure from creating twist in the main fishing line.

The idea of an artificial fishing lure is certainly not new; historians tend to agree that artificial lures were first used by the ancient Polynesians to target large fish species. These were made from pieces of highly polished Abalone shell and were attached to their fishing lines to attract fish to their hooks.

Trolling lures, specifically made for sport fishing, were first developed commercially in the late 1940's and are often attributed to American (and specifically Hawaiian) boat builders. These people were working with the then quite new fibreglass. They found that the resin used to bond the glass fibres could be poured into a small cup and so would set to form a solid shape, this was the basis for the first trolling lure heads. If fished on their own the heads are quite unstable in the water, particularly if the sea is rough, and require some form of stabiliser to keep them running straight. This is where the lure skirt was developed, firstly using strips of rubber inner tube, upholstery vinyl or even cured fish skins. These were cut into strips to form a fluttering tentacle action and then tied into the back of the lure head. The trailing skirt acted to stabilise the lure head and also added some attraction if a brightly coloured material was used.

Since their introduction trolling lures have evolved and developed considerably but the basic principles have not really changed, they still comprise of a solid head at the front with a flexible skirt trailing at the rear.

It is fair to say that the vast majority of the work that has gone into trolling lures over the last 50 years has been aimed at the head of the lure. A vast range of shapes and sizes have been developed, with each designed to create some form of swimming action and disturbance in the water as it is pulled behind the boat.

There are many theories regarding what attracts a large predatory fish to attack a trolling lure. This may be the swimming action, the disturbance and vibration caused in the water, the flash given off by sunlight striking the reflective materials that are typically

contained within the lure heads or the colour of the lure head and skirts. All certainly play a part but most top Big Game Angling experts would agree that the most important feature is what is termed the bubble trail or "smoke trail". This is the long stream of dense bubbles created as the lure is pulled through the water. If any large blunt faced object is pulled through water at some speed it will create turbulence and a bubbling effect. Much of the development work carried out on lures has been in making heads that maximise the size and density of the bubble trail that they create. It is accepted that a very dense trail of tiny bubbles (like smoke) is far more effective than an intermittent trail of large bubbles. There are probably two reasons for this, firstly the very dense smoke-like trail is highly visible in the water and can be several metres long behind the lure. Secondly, and something that has only recently been illustrated by underwater marine video filming, is that many prey species (e.g. small tuna) themselves give off dense, fine bubble streams when feeding and swimming rapidly through the water in large schools.

The vast majority of commercially produced trolling lures employ off-the-shelf PVC skirts. These are produced in large quantities, and quite cheaply, primarily in the Far East. They are manufactured by dip moulding. A metal former is dipped into molten PVC, it is cooled and then stripped off the former. The product looks something like the finger from a rubber glove (though larger) when it is first made, the sides are then slit for about three quarters of their length to form a series of smooth tentacles. When supplied to the fishing lure manufacturer, or angler, the skirt is closed at the narrow end, as if a teat. It is then necessary to cut off the end of the teat so as to form an open end that can be slipped over the rear of the lure head. This cutting is critical, the cut must be made in the correct place, so that the diameter is correct to suit the size of the lure head, and the cut must be made neatly so that it is even around its circumference. Failure to do this will result in a skirt that will not fit neatly and securely onto the lure head. For example, simply making a straight cut across a flattened teat will not yield the required circular aperture when the teat springs open. The cut skirt is then stretched over the back of the lure head where it locates around a truncated cone shaped section which is integral with the back of the lure head. As the PVC skirts are quite thin it is necessary to secure them in place to prevent them from pulling off during use. This is done by either gluing them on,

or tying them tightly with thin thread or dental floss. This method of fitting means that changing the skirts is quite awkward and time consuming. It is often necessary to change the skirts due to damage caused by sharp toothed fish and there are occasions when changing the colour of the skirt to suit the fishing conditions on the day may be beneficial.

- 5 Despite their disadvantages, these dip moulded PVC skirts have some advantages in that they are relatively cheap and can be made in very vibrant colours and can incorporate special effects such as glitter.

There are a small number of lure manufacturers who do not use the mass produced PVC skirts and who make their own skirts using upholstery vinyl. Though out of
10 fashion in the UK, vinyl upholstery is still widely used in the USA and, therefore, materials are readily available and can be used in a wide range of vibrant colours. Upholstery vinyl skirts are very awkward to make and to fit. A flat strip of material is cut to match the circumference of the lure head, it is then slit into thin strips and wrapped tightly around the rear of the lure head. It is vital that it is glued or tied in place.

15 **Summary of the Invention**

One aspect of the present invention aims to provide a fishing lure with improved performance in terms of attracting predatory fish. Another aspect of the invention aims to provide a fishing lure which overcomes, at least partially, the problems associated with the fitting and replacement of skirts on previous lure designs.

- 20 According to a first aspect of the present invention there is provided a fishing lure comprising a head and at least one tentacle attached to and extending from the head so as to be trailable behind the head as the lure is pulled through a body of water, the tentacle comprising at least one turbulence generating feature selected to disrupt water flow over the tentacle as the lure is pulled through the body of water.

- 25 It will be appreciated that the turbulence-generating feature may also be referred to as a flow disruptor or flow disruption means. This fishing lure provides the advantage that it generates a greater amount of disturbance as it is trolled through the water than a conventional lure because the disturbance created by the turbulence-generating feature or features on the tentacle is in addition to the disturbance created by the head. In embodi-

ments of the present invention, the head may have a conventional shape, at least over a forward portion.

By incorporating a tentacle with at least one flow-disrupting feature arranged on it, embodiments of the invention can yield improved performance in terms of the creation
5 of bubbles and disturbance in the water as the lure is trolled, in contrast to conventional lures with skirts of smooth, dip moulded PVC.

Preferably, the lure comprises a plurality of tentacles, each being provided with one or more flow-disrupting features, the tentacles being arranged as a skirt. Thus, the lure skirt can be made to have a very positive effect on the performance of the lure, particularly in terms of the important areas of the bubble trail and vibration in the water.
10

Preferably the turbulence-generating feature is located at a predetermined position along the length of the tentacle. More preferably, the tentacle comprises a plurality of turbulence-generating features located at respective positions along the tentacle's length. These features may be spaced out at regular intervals along the tentacle's length,
15 or alternatively may be distributed randomly.

The turbulence-generating features may take the form of a discontinuity in the cross-section of the tentacle.

In certain preferred embodiments, the tentacle or tentacles may be generally cylindrical, having a generally cylindrical core, and the turbulence-generating features (i.e. flow disruptors) may take the form of one or more of the following: an annular rib; a
20 ring; a lip; an edge; a spike; a protrusion; a perforation; a cavity; an appendage; a bead; a discontinuity in girth; or a region of increased girth. It will be appreciated that this list is not exhaustive, and other forms of flow-disrupting features may be employed. These features will take the form of some kind of discontinuity, disturbance, or perturbation in a surface which may otherwise be relatively smooth.
25

In one preferred form, each tentacle is generally cylindrical and comprises a plurality of flow-disrupting features spaced apart along its length, these features being annular ribs, each extending around the cylindrical core.

These annular ribs may have substantially the same size and shape as each other,
30 and in one preferred form are spaced apart evenly along the length of the tentacle. Thus,

each individual tentacle may have a heavily ribbed pattern along its length. This is to create disturbance and turbulence in the water, to aid the lure head in producing an intense trail of fine bubbles (the smoke trail) and also to give out vibration in the water.

5 In alternative embodiments of the invention, the tentacle or tentacles may comprise a generally flat strip or tape, and the flow-disrupting features may be selected from a list including: transverse ribs; perforations; cavities; indentations; spikes; edges; protrusions; appendages; pimples; and discontinuities in width, thickness or girth. Again, this list is not exhaustive.

10 In embodiments which employ strip or tape-like tentacles, the flow-disrupting features may be arranged on both sides, or just one side of the tape. Conveniently, when the tentacles are arranged as a skirt, the flow-disrupting features may be provided just on the outer surface of the tape.

Although substantially rigid tentacles may be employed, preferably the or each tentacle is flexible.

15 Preferably, the lure comprises a plurality of tentacles, each comprising at least one respective flow-disrupting feature. Preferably, the plurality of tentacles are arranged as a skirt. The ends of the tentacles forming the skirt may be embedded in the head. However, in a preferred form the lure comprises a skirt, the skirt comprising the plurality of tentacles and a collar, the tentacles being spaced apart around the collar, and each tentacle being attached to and extending from the collar. The collar is then attached to the
20 head by suitable means.

Preferably, the collar is detachable from the head to enable the skirt to be separated from the head.

25 Conveniently, the head comprises a forward portion and a base portion extending rearwardly from the forward portion along a longitudinal axis, the base portion comprising a neck and the collar being arranged around the neck.

Preferably the collar is resilient and the base portion comprises an annular flange or lip extending radially outward from the neck, the collar being stretchable over the flange or lip to attach the skirt to, and separate the skirt from, the head. In such arrangements, the resilience of the collar maintains the skirt in place, attached to the head,
30

and resists the drag force produced when the lure is trolled through the water, that drag force attempting to pull the skirt from the head.

5 Preferably the base portion of the head comprises an annular flange extending radially outwards from the neck, the neck connecting the flange to the forward portion, and the resilient collar comprises a bore having a shoulder, the collar being stretchable over the flange to bring the collar into a seated position on the base portion, such that, when in the seated position, the shoulder is adjacent to the flange and the shoulder and flange co-operate to inhibit separation of the skirt from the head.

10 Preferably, the collar bore comprises an annular barb, the shoulder being a rearward-facing annular surface of the barb.

Preferably, the fishing lure comprises a second plurality of tentacles arranged as a second skirt, this second skirt being arranged over or underneath the first skirt.

15 Conveniently, the second skirt may have the same form as the first skirt, and may be attached to the head in the same or a similar way. For example, the second skirt may comprise a second resilient collar having an annular barb in its bore for location on a rib or flange extending radially outward from a neck or root of the head.

As with the first skirt, the tentacles of the second skirt may also be provided with flow-disrupting features.

20 In certain preferred embodiments, the or each collar comprises a plurality of holes, spaced around a circle, each hole extending in a direction generally parallel to a longitudinal axis of the lure, each tentacle being secured in a respective one of these holes.

Conveniently, the or each collar may be generally cylindrical, having a generally annular rib face or wall, each tentacle extending from the rear face, or one of the rear faces.

25 Preferably, the or each tentacle is injection moulded. Preferably, the or each collar is injection moulded. The tentacles and skirt collars may be manufactured separately, the skirt then being fabricated, for example by gluing ends of the tentacles into place in suitable holes or sockets in the collar. Alternatively, the skirts may be formed as single components, for example by injection moulding.

According to a second aspect of the present invention there is provided a fishing lure comprising a head; and a first removable skirt, the head having a longitudinal axis and comprising a forward portion and a base portion comprising a neck, extending rearwardly from the forward portion, and an annular flange extending radially outwards from the neck portion, the neck connecting the flange to the forward portion, the skirt comprising
5 a resilient collar and a plurality of tentacles spaced around the collar, each tentacle being attached to and extending from the collar, wherein the collar comprises a bore having a shoulder, the collar being stretchable over the flange to move the shoulder forward past the flange and bring the collar into a seated position on the base portion, such that, when
10 in the seated position, the shoulder is adjacent the flange and the shoulder and flange co-operate to inhibit separation of the skirt from the head.

This provides the advantage that the fishing lure can be assembled quickly and easily. Furthermore, the skirt can be removed and replaced quickly and easily, for example if one skirt becomes damaged, or if it is desirable to change the skirt for one having tentacles of different shape and/or pattern or colour. Preferably, the tentacles of the removable skirt comprise flow-disrupting features, as used in embodiments of the first aspect. However, the features relating to the attachment of the skirt to the head provide significant advantages over prior art arrangements even if conventional, smooth tentacles are used.

20 Preferably the collar bore comprises an annular barb, the shoulder being a rearward-facing surface of the barb.

Preferably, the neck is tapered, narrowing away from the forward portion (i.e. it becomes more narrow as one moves rearward along the longitudinal axis) and the barb comprises a forward-facing surface which sits on a surface of the neck when the collar is in
25 the seated position.

In one preferred arrangement, the neck is generally conical or frusto-conical, such that the surface against which the forward-facing surface of the barb sits is generally frusto-conical. Preferably, the forward-facing surface of the barb is profiled to match the taper of the neck. For example, the forward-facing surface may also be frusto-conical, the
30 cone angle matching that of the neck.

The neck may have the form of a tapering root.

Preferably, the fishing lure comprises a second skirt comprising a second resilient collar and a second plurality of tentacles. The second skirt may be arranged to sit over or under the first skirt. Preferably the second skirt is also removable, and it may be attached
5 to the base portion of the head in the same or a similar manner to the first skirt. For this purpose, the base portion of the head may be provided with a second annular flange or rib extending radially outward from the neck. The first and second annular flanges or ribs may be provided at different longitudinal positions along the length of a tapering neck.

Preferably, the first and second collars are arranged to sit concentrically on the
10 neck.

Preferably, the collar or collars are generally cylindrical, having an annular, rear-facing end surface, with each tentacle extending from a respective one of the end surfaces.

Conveniently, the collars may comprise a plurality of axially extending holes,
15 spaced around a circle (i.e. circumference) and each tentacle is secured in a respective one of these holes. These holes may be evenly spaced around the circumference.

As with the first aspect, each tentacle may be injection moulded, and the collars may be injection moulded. The removable skirts may be fabricated from separate collars and tentacles, or alternatively may be formed as a single component, for example by injection moulding. A third aspect of the present invention provides a tentacle for a fishing
20 lure, the tentacle comprising at least one flow disruptor arranged at a predetermined position along its length.

A further aspect of the present invention provides a skirt for a fishing lure, the skirt comprising a collar and a plurality of tentacles, at least one of which is provided with
25 a flow-disrupting feature or features along its length.

Another aspect of the present invention provides a skirt for a fishing lure, the skirt comprising a plurality of tentacles attached to and extending from a resilient collar, the collar having a bore including a rearward-facing shoulder. The collar may include an annular barb. A further aspect of the invention provides a head for a fishing lure, the head
30 having a forward portion and a base portion, extending rearwardly from the forward

portion, the base portion including a neck and an annular flange or rib extending radially outward from the neck for engaging a shoulder in the bore of a collar of a lure skirt.

Brief Description of the Drawings

Embodiments of the present invention will now be described with reference to the
5 accompanying drawings, of which;

Fig 1 is a view of a fishing lure embodying the invention;

Fig 2 is a side view of the head of the lure of Fig 1;

Fig 3 is a perspective view of the inner skirt of the lure of Fig 1;

Fig 4 is a side view of one end of a tentacle used in the manufacture of the skirt
10 shown in Fig 3;

Fig 5 is a sectional view of the top of the inner skirt of the lure shown in Fig 1;

Fig 6 is a sectional view of the head of the lure of Fig 1, with the inner and outer
skirts attached;

Fig 7 is a perspective view of the outer skirt of the lure of Fig 1;

Fig 8 is a sectional view of the collar of the outer skirt of the lure of Fig 1;
15

Fig 9 is a schematic side view of a tentacle suitable for use in embodiments of the
invention;

Fig 10 is a schematic side view of a further tentacle embodying the invention;

Fig 11 is a schematic perspective view of another tentacle embodying the inven-
20 tion;

Fig 12 is a schematic perspective view of yet another tentacle embodying the in-
vention;

Fig 13 is a schematic perspective view of a further tentacle embodying the inven-
tion;

Fig 14 is a schematic perspective schematic view of yet another tentacle embody-
25 ing the invention;

Fig 15 is a schematic view of a lure embodying the invention;

Fig 16 is a schematic sectional view of the head and upper part of the skirt of an-
other lure embodying the invention;

Fig 17 is a schematic sectional view of a further lure embodying the invention;
30

Fig 18 is a schematic sectional view of a lure skirt embodying the invention; and

Fig 19 is a schematic representation of another lure embodying the invention.

Detailed Description of the Preferred Embodiments

Referring now to Fig 1, a trolling lure embodying the invention comprises a head 1
5 and two nested skirts of ribbed tentacles attached to and trailing the head. The outer skirt 2a comprises a generally cylindrical resilient collar 3a and a plurality of ribbed tentacles 4a, each one being attached to and extending from the collar 3a. The inner skirt 2b comprises a resilient generally cylindrical collar 3b of smaller diameter, and a second group of ribbed tentacles 4b, each tentacle being attached to and extending from the inner collar 3b. In this embodiment the tentacles of the inner and outer skirt all have generally the same length, but the outer skirt collar 3a is attached higher up the neck of the head 1 so that the tentacles of the inner skirt extend out beyond the end of the outer skirt.

Fig 2 shows the head of the lure of Fig 1. The head 1 comprises a forward portion 11 which has a conventional shape.

In this example the head 1 is generally symmetrical around a longitudinal axis A but such symmetry is not essential. A base portion 12 of the head 1 extends rearwardly along the longitudinal axis A from a base shoulder 111 of the head. The base portion 12 comprises a tapering neck 13 which is generally frusto-conical. The tapering neck may also be referred to as a tapering root. The direction of the taper is such that the neck becomes progressively more narrow as one moves in the reverse direction along the longitudinal axis A. An inner annular flange 14b is located at a lower end of the neck 13, and extends radially outwards from the neck surface. A second annular flange 14a is provided at an intermediate position on the neck, between the inner annular flange 14b and the forward portion 11. Thus, between the intermediate annular flange 14a and the forward portion 11 there is a generally frusto-conical surface 13a upon which the collar of the outer skirt seats. There is a second frusto-conical surface 13b of the neck, between the two annular flanges, and this is the surface upon which the collar of the inner skirt sits. The two annular flanges may also be referred to as stepped locating rings. These features may be incorporated within the lure head as integral features when the head is cast.

Fig 3 shows the assembled inner skirt of the lure of Fig 1. The skirt comprises sixteen ribbed tentacles, each having an upper end secured in a respective fixing hole 32b in the skirt collar 3b. As can be seen, the collar is generally cylindrical, and the fixing holes 32b, which each extend in the axial direction (i.e. generally parallel to the longitudinal axis of the skirt assembly). The fixing holes 32b are evenly spaced around the resilient collar 3b, with their centres lying on a common circle. The tentacles 4b all have the same length, and each comprises a plurality of ribs 44b spaced apart at regular intervals along the tentacle's length. The collar 3b has a bore which includes an annular barb 31b, and, beneath the barb, a generally smooth cylindrical surface 33b.

Fig 4 shows one end of a tentacle used in the manufacture of the skirt shown in Fig 3. The tentacle 4 has a leading end portion 45 which is used to help insert the tentacle into the fixing hole in the skirt collar. This leading portion 45 is then removed, and does not form part of the assembled skirt. Immediately behind this leading portion 45 is a shallow tapering section 41 whose taper matches the internal taper on the fixing holes 32 in the skirt collar. In this embodiment, this tapering surface 31 is glued to the corresponding surface in the fixing holes 32. Behind the shallow tapering section 41 is an annular rib 42 having increased diameter and acting to prevent the tentacle from being pulled completely through the skirt collar during assembly. Trailing this first annular rib is the remainder of the tentacle, which comprises a generally cylindrical core 43 and the series of regularly spaced flow-disrupting annular ribs 44. It will be appreciated that when the assembled lure is pulled through water, rather than the water being able to flow smoothly over the core 43, the succession of ribs 44 disturbs the water flow and causes vibration and disturbance in the water. In particular, this arrangement of ribs on the tentacles enhances the production of a trail of fine bubbles behind the lure (i.e. enhances the production of the smoke trail) and enhances the attractiveness of the lure to predatory fish.

Moving on to Fig 5, this shows a sectional view of the top of the assembled inner lure skirt of the lure of Fig 1. As can be seen, the tapered, generally conical leading portions 41b of the tentacles are secured in place in the correspondingly tapered lower portion of the axially extending fixing holes 32b in the collar 3b. The leading portions 45 of the tentacles have been removed so that the tentacles terminate at a position level with a

lip 322b at the bottom of a cup having cylindrical side wall 321b at the top of the fixing hole 32b. The skirt collar 3b has a bore 34b. In a lower half of the bore is a generally cylindrical side wall 33b. In the upper half of the bore, there is provided an annular barb 31b. A surface of this barb faces in the nominal reverse direction, and so defines a reverse-facing shoulder 312b. This shoulder surface is generally horizontal in the figure and forms a ring or lip extending inwards from the cylindrical wall 33b of the bore. The barb 31b also has a forward-facing surface 311b which is generally frusto-conical in this example.

The significance of the barb and shoulder will be appreciated from Fig 6. This shows the inner collar 3b and outer collar 3a, from which the skirts of tentacles are suspended, attached to the head 1, i.e. seated in their respective positions on the neck 13. Looking first at the outer collar 3a, its barb 31a forms a constriction in its bore which means that the outer collar 3a must be stretched (i.e. distorted) in order to push it forwards over the intermediate annular flange 14a. As soon as the barb 31a is past the forwardmost edge of the flange 14a the collar 3a can contract, bringing the forward-facing surface 311a of the barb 31a into contact with the seating surface 13a of the neck. Also, the rearward-facing shoulder 312a of the barb then sits against the forward-facing surface 141a of the intermediate flange 14a. The resilience of the collar 3a keeps the collar seated in this position, and the barb shoulder 312a and flange face 141a cooperate to prevent the outer skirt from being pulled from the head when the lure is trolled through water. Also in Fig 6 the collar 3b of the inner skirt can be seen seated in its 'attached' position. Its barb 31b cooperates with the end flange 14b in the same way as the barb and flange for the outer collar. The inner collar is dimensioned such that it sits inside the circle defined by the skirt of tentacles suspended from the outer collar 3a. Figure 6 also shows the concave, dished top face of the head 1, and the bore 112 extending through the centre of the head, generally along its longitudinal axis, this bore being for accommodating the fishing line or leader or trace. The dished surface 111 and bore 112 are conventional features.

The empty 'cup' portions at the forward (i.e. upper) ends of the axial fixing holes 32a and 32b of the resilient collars increase the flexibility of the leading edges of the annular barbs 31a and 31b and thus facilitate attachment of the skirts to the lure head 1.

5 Moving on to Fig 7, this shows the outer skirt of the lure of Fig 1. As can be seen, its construction is generally the same as that of the inner skirt. One difference, however, is that the outer skirt comprises twenty generally cylindrical flexible tentacles, rather than sixteen. The fixing holes 32a have centres which lie on a common circle, that circle having a larger diameter than the corresponding circle linking the centres of the fixing holes of the inner skirt collar.

10 Fig 8 is a sectional view of just the flexible collar of the skirt assembly from Fig 7. The annular barb 31a, with rear-facing shoulder 312a and forward-facing frusto-conical surface 311a can be clearly seen. Also, the figure shows the generally cylindrical side wall 321a of the cup at the upper end of the fixing holes 32a, together with the annular shoulder 322a at the base of the cup, and the gently tapering surface 323a for receiving and
15 engaging the correspondingly shaped tip of the tentacles.

Figs 9 to 14 show, in highly schematic form, a variety of tentacles which may be used in lures embodying the invention to give improved smoke trail generation performance, and which themselves embody the invention. The tentacle of Fig 9 comprises a series of connected truncated cones 46. The base edges of these cones 44 are features
20 which can generate significant amounts of disturbance (i.e. turbulence) as the tentacle is drawn through water. The tentacle may be employed in embodiments of the invention in either orientation, i.e. such that it is drawn in either the forward or reverse direction, although of course the generation of turbulence will be greatest if the direction of water flow is with the direction of taper of the conical sections 46.

25 In Fig 10, the tentacle comprises a generally cylindrical core 43 and a series of beads 44, of differing sizes, is arranged on the core 43. The beads are arranged irregularly along the length of the tentacle. As can be seen, the beads represent discontinuities in the cross section of the tentacle. Each bead represents a region of locally increased girth.

The tentacle of Fig 11 comprises a flexible tape 47. The turbulence-generating features take the form of a series of transverse ribs 441, each of which protrudes from and runs across one side 471 of the tape 47. The reverse side 472 of the tape 47 is substantially smooth. It will be appreciated that Figs 9-14 show only short lengths of tentacles, in schematic form, suitable for use in embodiments. In reality, the tentacles may be longer and may incorporate a greater number of flow-disrupting features.

Fig 12 illustrates an alternative form of tentacle which comprises a ribbon 47 of flexible material, having substantially constant thickness but varying width. Regions of increased width 442 provide disruption to flow of water along the tentacle 4. Leading edges 443 and 444 of these wider regions provide further turbulence-generating features.

Fig 13 shows, in highly schematic form, part of a further tentacle embodying the invention. This tentacle comprises a strip 47 of flexible material, on one side of which there are arranged transverse stripes with alternating roughness. Stripes 445 are relatively smooth, and stripes 446 are roughened.

Fig 14 shows another form of flexible tentacle, the tentacle being based on a tape 47 with flow disruption being provided by a series of perforations 447 through the tape.

Referring now to Fig 15, this shows a further lure embodying the invention. The lure comprises a head 1 having a bore 112 for receiving a fishing line or trace. Trailing from the head 1 there is a single tentacle 4 in the form of a flexible ribbon 47. On one side of the ribbon there is an irregular array of pimples 448, each of which acts to disturb the flow of water over the tape surface as the lure is drawn through the water.

Fig 16 illustrates a further embodiment. In this embodiment, a removable skirt comprises a resilient ring 3 and a plurality of flexible tentacles 4 extending from the ring. The lure comprises a head 1 having a neck 13 defining an annular ring seat 131. The ring seat 131 defines a groove for receiving the ring 3, and widens outward to define a lip 14 of increased diameter. The resilient ring 3 must be stretched to pass over the lip 14 and take up its seated position. It will be appreciated that a portion of the surface of the ring defines a rearwardly facing shoulder 312 which sits against the forward-facing surface of the lip 14.

Fig 17 shows a further embodiment where a skirt of tentacles 4 has been formed by embedding the upper ends of the tentacles in the head 1 of the lure as the head has been cast. Each tentacle 4 comprises a series of reverse-pointing arrows, the trailing corners of which define flow-disrupting edges 44.

5 Fig 18 shows a one-piece injection-moulded skirt for a lure embodying the invention. The skirt comprises a collar portion 3 having a bore 34 into which an annular formation with V-shaped cross section extends. A reverse-facing surface of the projecting member defines a shoulder 312 for engaging with the annular flange or rib on the base of a lure head. A plurality of strip-like tentacles 4 have been formed integrally with the collar
10 3, and each strip comprises a series of square-shouldered transverse ribs to disrupt water flow over the tentacles. These ribs are formed on the outer surface of the tentacles.

It will be appreciated that the skirt shown in Fig 18 is generally tubular, the wall of the tube incorporating slits or cuts to separate the tube into generally strip-like tentacles. The skirt itself could be regarded as a single, tubular tentacle.

15 Fig 19 shows another lure embodying the invention, comprising a head 1 and a single tubular tentacle 4. The tube tentacle is flexible, thin-walled and comprises an array of flow-disrupting buttons 44 (i.e. pimples) on its outer surface. In use, the hook or hooks will be accommodated inside the tube, which is easily pierced. In this example, the tube is not slit, but in other embodiments one or more longitudinal slits may be used, e.g.
20 to facilitate rigging of the hook(s) and/or produce a plurality of fluttering sub-tentacles.

Embodiments of the invention may provide trolling lures for use in salt water, to attract the type of predatory species mentioned in the introduction to this specification. However, certain embodiments may be suitably sized so that they can be used for less exotic fish species (cod, bass, etc.) or even in fresh water for predatory species such as
25 salmon, trout, pike, etc. Embodiments of the invention may be used as trolling lures. However, lures embodying the invention need not necessarily be used in the trolling fashion. They may be used in a static fashion, allowed to drift freely with the motion of the water, cast out and retrieved by the angler, or 'jigged' by allowing the lure to sink and then imparting an action to the lure by movement of the fishing rod.

It will be appreciated that the novelty of certain embodiments lies in the design of the lure skirt and/or the way in which the skirts are connected onto the lure head.

In certain embodiments, each individual tentacle has a heavily ribbed pattern along its length. This is to create disturbance and turbulence in the water, to aid the lure head in producing an intense trail of fine bubbles (the smoke trail) and also to give out vibration in the water. Although some examples shown in the drawings have a series of radiused circular discs forming the lure skirt tentacle, there is no reason why they must be this shape. They may be any shape – oval, square, triangular and may have radiused or sharp edges. Also, they need not have a consistent profile, for example a tentacle made up out of a connected series of inverted truncated cones would make an excellent profile (saw tooth effect).

In certain embodiments, the tentacles are injection moulded as individual strips and are then assembled into an injection moulded flexible plastic ring to form a completed skirt. The advantage of individually moulded tentacles is that a range of colours can be employed to create a variable colour effect around the skirt. For example, it is usually preferred for the skirt to have a dark colour on one side and a lighter colour on the other. When pulled through the water with the dark colour uppermost this more closely reflects the natural colouration of fish. The assembly method also makes it easy to add different coloured stripes to the skirt, for example a red or yellow lateral stripe is popular. It is technically possible to manufacture the tentacles and ring as a completed one-piece injection moulding, though the cost in tooling and machinery necessary to achieve this is higher. Thus, certain embodiments may comprise a one-piece moulded skirt or skirts.

The assembly method to produce the skirt shown in Fig 3 currently uses an adhesive to bond each tentacle into the corresponding location hole in the main ring. It is also possible to assemble a similar skirt by using some form of mechanical fitment to secure the tentacles into the ring and it is also feasible to use one of the plastic welding techniques to bond them into position.

Once the skirts, such as those shown in Fig 3, are assembled they are fitted onto the lure head by means of the flexible moulded plastic rings (i.e. collars) fitting over and

around corresponding grooves and ridges that are incorporated as integral features within the back of the lure head. Currently the grooves and ridges in the lure head are formed when the head is cast and are, therefore, formed in the same polyurethane resin as the head. In the future the series of grooves and ridges may be formed as a separate plastic moulding that is then glued, welded or mechanically fixed onto the main head or
5 encapsulated into the polyurethane resin as the head is cast.

Benefits of the skirt assemblies of certain preferred embodiments include:

There is no need to cut the skirt to make it fit onto the back of the lure head; it is supplied correctly sized and ready to fit.

10 The skirts do not need to be glued or tied to keep them attached during use; the mechanical fitment is all that is required.

The skirts can be replaced quickly and easily, if they should become damaged, without the need for glue or thread.

Should the angler wish to change the colour of the skirts on the lure to suit the
15 fishing conditions on the day he can do so quickly and easily. Furthermore the original skirts can be removed without damaging them and then put back at a later date if required. Conventional skirts that are glued on cannot be removed without damaging them.

20

CLAIMS

1. A fishing lure comprising:
a head; and
at least one tentacle attached to and extending from the head so as to be trailable
5 behind the head as the lure is pulled through a body of water, the tentacle comprising at least one turbulence generating feature selected to disrupt water flow over the tentacle as the lure is pulled through the body of water.
2. A fishing lure in accordance with claim 1, wherein the turbulence generating feature is located at a predetermined position along the length of the tentacle.
- 10 3. A fishing lure in accordance with claim 1 or claim 2 wherein the tentacle comprises a plurality of said turbulence generating features located at respective positions along the tentacle's length.
4. A fishing lure in accordance with claim 3 wherein the plurality of turbulence generating features are spaced out regularly along the tentacle's length.
- 15 5. A fishing lure in accordance with any preceding claim wherein the or each turbulence generating feature comprises a discontinuity in the cross section of the tentacle.
6. A fishing lure in accordance with any preceding claim, wherein the tentacle is generally cylindrical, having a generally cylindrical core, and the or each said turbulence
20 generating feature is selected from a list comprising: annular rib; ring; lip; edge; spike; protrusion; perforation; cavity; appendage; bead; discontinuity in girth; region of increased girth.
7. A fishing lure in accordance with claim 6 wherein the generally cylindrical tentacle comprises a plurality of flow-disrupting features spaced apart along its length,
25 each feature being an angular rib, around the cylindrical core.
8. A fishing lure in accordance with claim 7 wherein the annular ribs each have substantially the same size and shape.
9. A fishing lure in accordance with claim 7 or claim 8 wherein the annular ribs are spaced apart evenly along the length of the tentacle.

10. A fishing lure in accordance with any one of claims 1 to 5 wherein the tentacle comprises a generally flat strip or tape and the or each feature is selected from a list comprising; transverse rib; perforation; cavity; indentation; spike; edge; protrusion; appendage; pimple; discontinuity in width, thickness or girth.

5 11. A fishing lure in accordance with claim 10 wherein the selected feature or features are arranged on one side of the strip or tape.

12. A fishing lure in accordance with any preceding claim where the tentacle is flexible.

10 13. A fishing lure in accordance with any preceding claim and comprising a plurality of said tentacles, each tentacle comprising at least one respective said flow-disrupting feature.

14. A fishing lure in accordance with claim 13 wherein the plurality of tentacles are arranged as a first skirt.

15 15. A fishing lure in accordance with claim 14, comprising a first skirt, the skirt comprising said plurality of tentacles and a collar, the tentacles being spaced around the collar, each tentacle being attached to and extending from the collar, the collar being attached to the head.

16. A fishing lure in accordance with claim 15, wherein the collar is detachable from the head to separate the skirt from the head.

20 17. A fishing lure in accordance with claim 15 or claim 16 wherein the head comprises a forward portion and a base portion extending rearwardly from the forward portion along a longitudinal axis, the base portion comprising a neck and the collar being arranged around the neck.

25 18. A fishing lure in accordance with claim 17 wherein the collar is resilient and the base portion comprises an annular flange or lip extending radially outward from the neck, the collar being stretchable over the flange or lip to attach the skirt to, and separate the skirt from, the head.

30 19. A fishing lure in accordance with claim 18 wherein the base portion comprises an annular flange extending radially outwards from the neck, the neck connecting the flange to the forward portion, and the resilient collar comprises a bore having a

shoulder, the collar being stretchable over the flange to bring the collar into a seated position on the base portion, such that, when in the seated position, the shoulder is adjacent the flange and the shoulder and flange cooperate to inhibit separation of the skirt from the head.

5 20. A fishing lure in accordance with claim 19, wherein the collar bore comprises an annular barb, the shoulder being a rearward facing annular surface of the barb.

 21. A fishing lure in accordance with any one of claims 14 to 20 comprising a second plurality of tentacles arranged as a second skirt, said second skirt being arranged underneath the first skirt.

10 22. A fishing lure in accordance with claim 21, comprising a second skirt, the second skirt comprising said second plurality of tentacles and a second collar, the second plurality of tentacles being spaced around the second collar and each of the second plurality of tentacles being attached to and extending from the second collar, the second collar being attached to the head.

15 23. A fishing lure in accordance with any one of claims 21 to 22 wherein at least one of the second plurality of tentacles comprises at least one flow-disrupter.

 24. A fishing lure in accordance with any one of claims 15 to 23 wherein the or each collar comprises a plurality of holes, each hole extending in a direction generally parallel to a longitudinal axis of the lure, each tentacle being secured in a respective one of
20 said holes.

 25. A fishing lure in accordance with any one of claims 15 to 23 wherein the or each collar is generally cylindrical, having a generally annular rear face, each tentacle extending from the, or a respective one of the rear faces.

 26. A fishing lure in accordance with any preceding claim wherein the or each
25 tentacle is injection moulded.

 27. A fishing lure in accordance with any one of claims 15 to 25, or claim 26 as dependent on any one of claims 15 to 25, wherein the or each collar is injection moulded.

28. A fishing lure in accordance with claim 27 wherein the or each skirt, comprising a collar and respective plurality of tentacles, is injection moulded as single component.

29. A fishing lure comprising:

5 a head; and
a first removable skirt,

the head having a longitudinal axis and comprising a forward portion and a base portion comprising a neck, extending rearwardly from the forward portion, and an annular flange extending radially outwards from the neck portion, the neck connecting the
10 flange to the forward portion,

the skirt comprising a resilient collar and a plurality of tentacles spaced around the collar, each tentacle being attached to and extending from the collar, wherein the collar comprises a bore having a shoulder, the collar being stretchable over the flange to move the shoulder forward past the flange and bring the collar into a seated position on the
15 base portion, such that, when in the seated position, the shoulder is adjacent the flange and the shoulder and flange cooperate to inhibit separation of the skirt from the head.

30. A fishing lure in accordance with claim 29, wherein the collar bore comprises an annular barb, said shoulder being a rearward facing surface of the barb.

31. A fishing lure in accordance with claim 30 wherein the neck is tapered,
20 narrowing away from the forward position, and the barb comprises a forward-facing surface which sits on a surface of the neck when the collar is in the seated position.

32. A fishing lure in accordance with claim 31 wherein said neck surface is generally frusto-conical.

33. A fishing lure in accordance with claim 31 or 32 wherein the forward facing surface of the barb is profiled to match the taper of the neck.
25

34. A fishing lure in accordance with any one of claims 29 to 33 comprising a second skirt, comprising a second resilient collar and a second plurality of tentacles, the second skirt being arranged to sit over the first skirt.

35. A fishing lure in accordance with claim 34 wherein the second skirt is removable, the base portion comprising a second annular flange extending radially outward
30

from the neck portion and positioned between the forward portion and the first annular flange, the second collar comprising a second bore having a second shoulder, the second shoulder being stretchable over the second flange to bring the second collar into a seated position on the neck, with the second shoulder in cooperation with the second flange.

5 36. A fishing lure in accordance with claim 34 or claim 35 wherein the first and second collars are arranged to sit concentrically on the neck.

 37. A fishing lure in accordance with any one of claims 34 to 36 wherein the second collar has a larger diameter than the first.

 38. A fishing lure in accordance with any one of claims 29 to 37, wherein the
10 or each collar is generally cylindrical, having an annular, rear-facing end surface, and each tentacle extends from the, or a respective one of the said end surfaces.

 39. A fishing lure in accordance with claim 38 wherein the or each collar comprises a plurality of axially extending holes, spaced around a circumference, and each tentacle is secured in a respective said hole.

15 40. A fishing lure in accordance with any one of claims 29 to 39 wherein each tentacle is injection moulded.

 41. A fishing lure in accordance with any one of claims 29 to 40, wherein the or each collar is injection moulded.

 42. A fishing lure in accordance with claim 41 wherein the or each skirt, comprising a collar and tentacles, is formed as a single injection moulded component.
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 43. A fishing lure in accordance with any one of claims 29 to 41, wherein the or each skirt is fabricated, the collar and tentacles being separate components.

 44. A fishing lure in accordance with any one of claims 29 to 43 wherein at least one of said tentacles comprises at least one turbulence generating feature selected to
25 disrupt water flow over the tentacle as the lure is pulled through water.

 45. A fishing lure in accordance with claim 44 wherein a plurality of said tentacles comprise turbulence-generating features.

 46. A fishing lure in accordance with claim 45 wherein each tentacle comprises a plurality of turbulence-generating features, spaced apart along a length of the tentacle.

47. A fishing lure in accordance with any one of claims 29 to 46, wherein each tentacle is generally cylindrical.

48. A tentacle for a fishing lure in accordance with any one of claims 1 to 28.

49. A skirt for a fishing lure in accordance with any one of claims 15 to 47,
5 comprising a said collar and a said plurality of tentacles.

50. A head for a fishing lure in accordance with any one of claims 29 to 47.

51. A fishing lure substantially as hereinbefore described with reference to and/or as shown in the accompanying drawings.

52. A tentacle for a fishing lure substantially as hereinbefore described with
10 reference to and/or as shown in the accompanying drawings.

53. A skirt for a fishing lure substantially as hereinbefore described with reference to and/or as shown in the accompanying drawings.

54. A head for a fishing lure substantially as hereinbefore described with reference to and/or as shown in the accompanying drawings.



Application No: GB 0304585.3
Claims searched: 1-28, 48

Examiner: Carrie-Ann Elias
Date of search: 5 September 2003

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance	
X	1-14, 26, 48	US 4214397	(KENT) see esp. column 1 lines 47-63, column 2 lines 44-66, column 3 lines 25-62 and figures
X	1,2,3,5, 10-16	US 5709047	(LINK) see esp. column 4 lines 1-22, 48-60 and figures
X	1-9, 12, 26, 48	US 5640798	(GARST) see esp. column 1 line 65 - column 2 line 12, column 2 line 32-43, column 5 lines 1-19 and figures
X	1-9, 12, 48	US 4709501	(GARST) see esp. column 3 lines 28-39 and figures
X	1-9, 12, 26, 48	US 4914850	(RICE) see esp. column 1 lines 45-68, column 2 line 53 - column 3 line 12 and figures
X	1-9, 12, 48	US 6115956	(FIRMIN) see esp. column 2 line 37 - column 3 line 25 and figures
X	1-9, 12, 48	US 3992800	(NEIL) see esp. column 2 lines 5-21 and figures
X	1,2,3,5,10, 12,48	US 5524377	(FREEMAN) see esp. column 2 lines 49-64 and figures

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention
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Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^v:

A1A

Worldwide search of patent documents classified in the following areas of the IPC⁷:

A01K

The following online and other databases have been used in the preparation of this search report:



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Application No: GB 0304585.3
Claims searched: 1-28, 48

Examiner: Carrie-Ann Elias
Date of search: 5 September 2003

Online: WPI, EPODOC, PAJ